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(54) CONTAINER WITH LOCKING REINFORCEMENT PANELS

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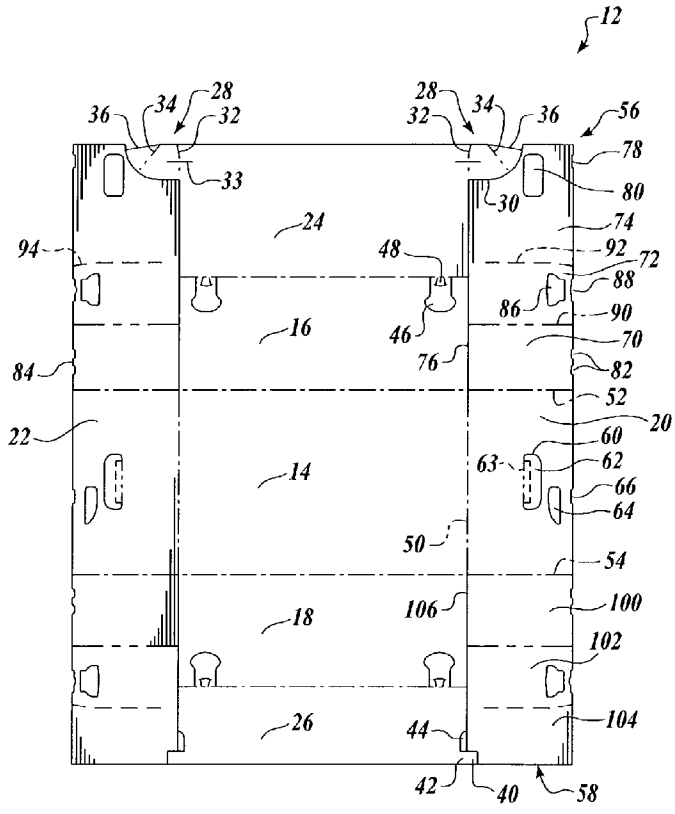
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(57) **ABSTRACT**

A container (**10**) formed from a one-piece blank (**12**) including a bottom panel (**14**), first and second opposed side walls (**16**), (**18**), and first and second end walls (**20**), (**22**). A top lid panel (**24**) connects to the first side wall and a bottom lid panel (**26**) connects to the second side wall. A locking tab (**46**) is formed in the first side wall and includes a thumb notch (**48**) located within the tab. The top lid panel includes a pair of cover latches (**28**) located on the outer corners thereof. The bottom lid panel includes a pair of alignment tabs (**40**) located on the outer corners thereof. Each end wall includes a hand hole lock (**60**), a lock slot (**64**), and a recess (**66**) located along the end wall exterior edge. The lock slot is located between the recess and the hand hole lock. Each end wall further includes first and second reinforcing panel sub-assemblies (**56**), (**58**), each having an inner panel (**70**), (**100**), a middle panel (**72**), (**102**), and an outer panel (**74**), (**104**). Each inner panel includes a pair of recesses (**82**) and an intermediate tab (**84**) all located along an inner panel exterior edge. Each middle panel includes a locking slot (**86**) near the middle panel exterior edge. The outer panel (**74**) of the first sub-assembly includes a recess (**78**) along an outer panel exterior edge and a hand hole (**80**). As assembled, the locking tabs are disposed within the lock slots with the intermediate tab of the inner panel at least partially inserted into the locking tab thumb notch. The cover latches are inserted into the locking slots of the end walls. The alignment tabs are positioned in the aligned recesses of the outer panel and the end wall.



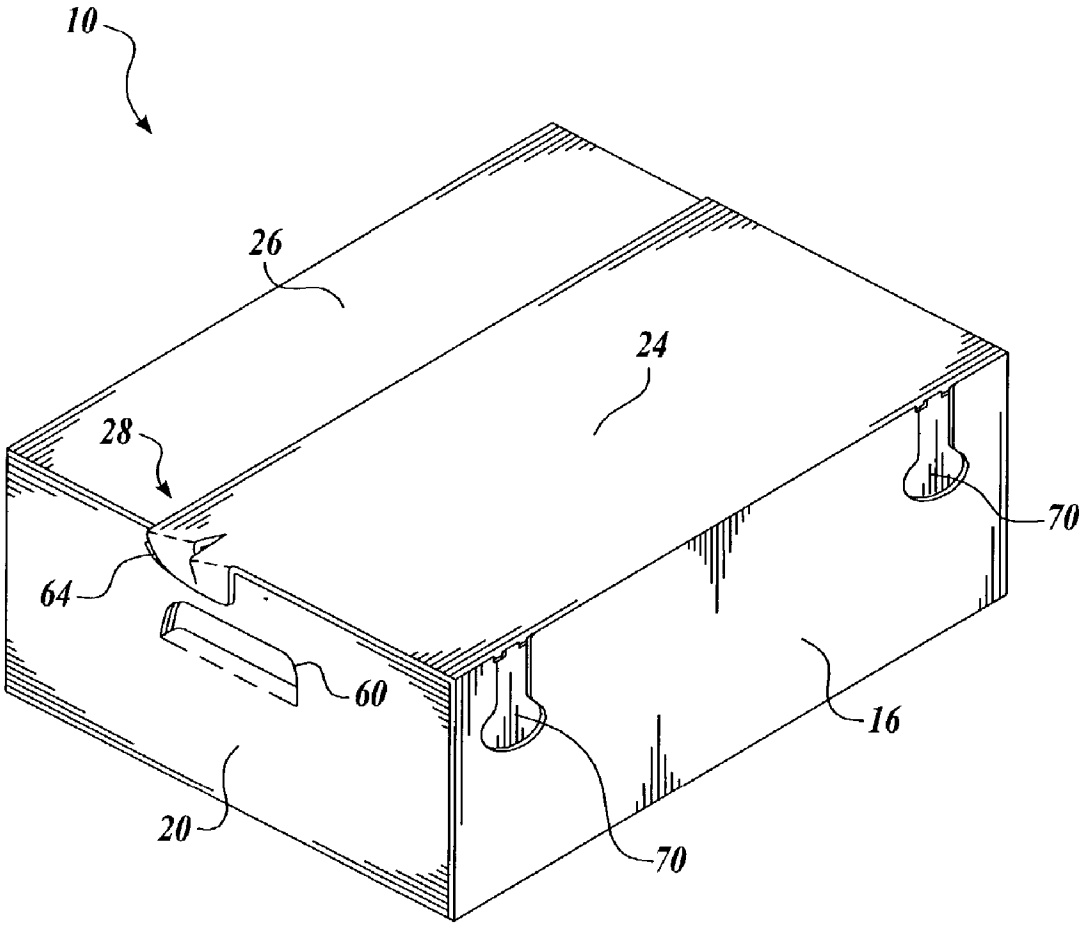


Fig. 1.

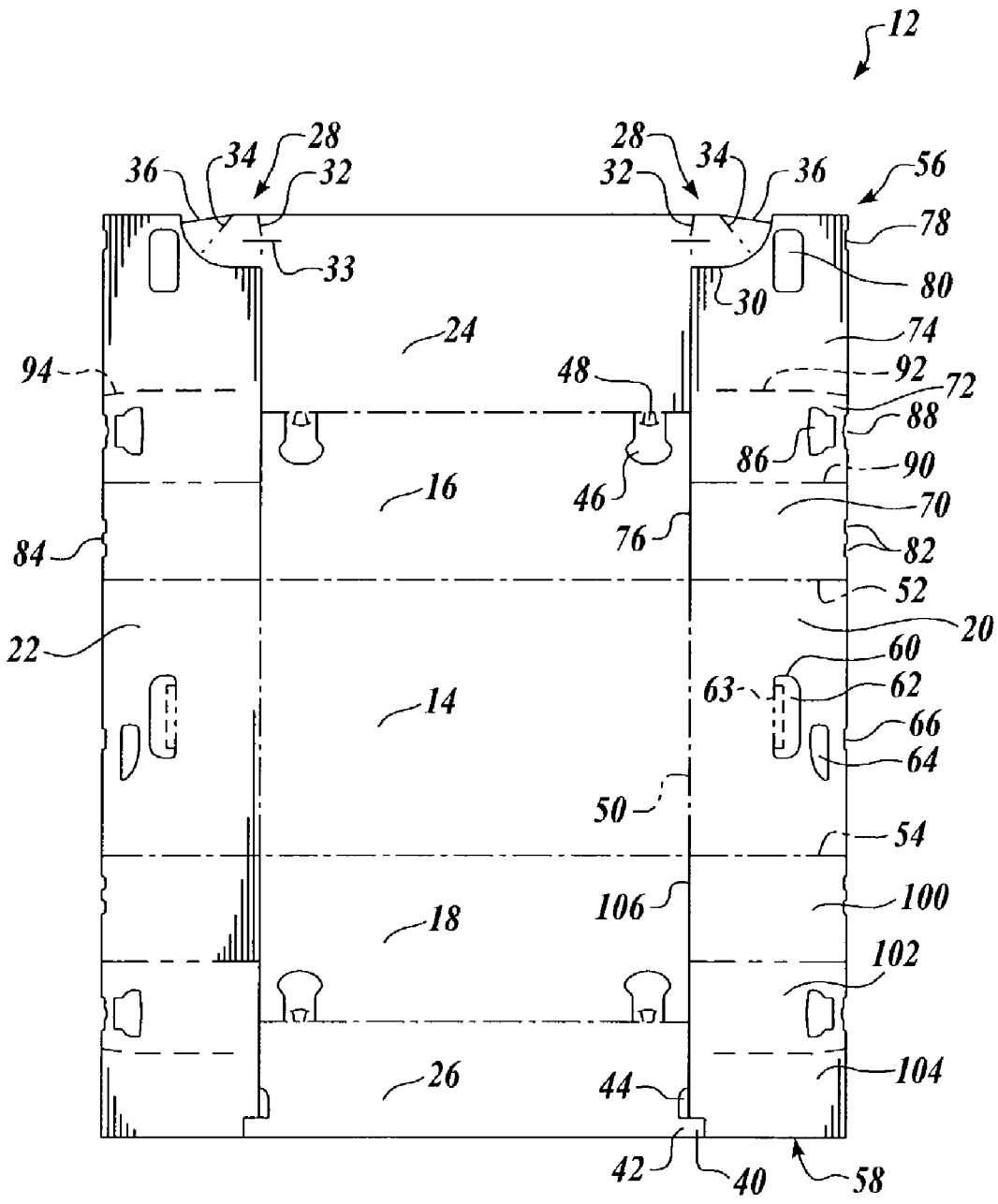

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Fig. 2.

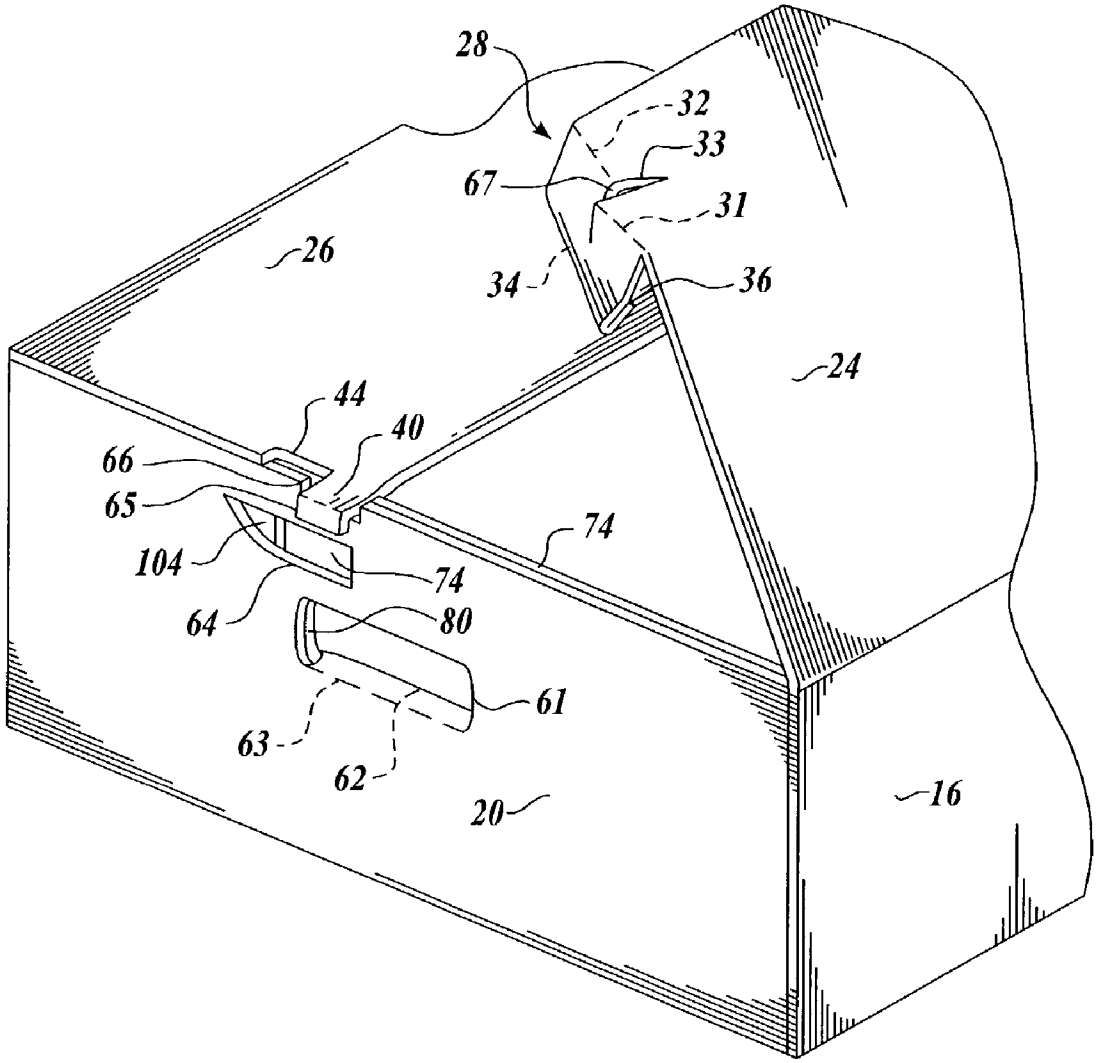


Fig. 3.

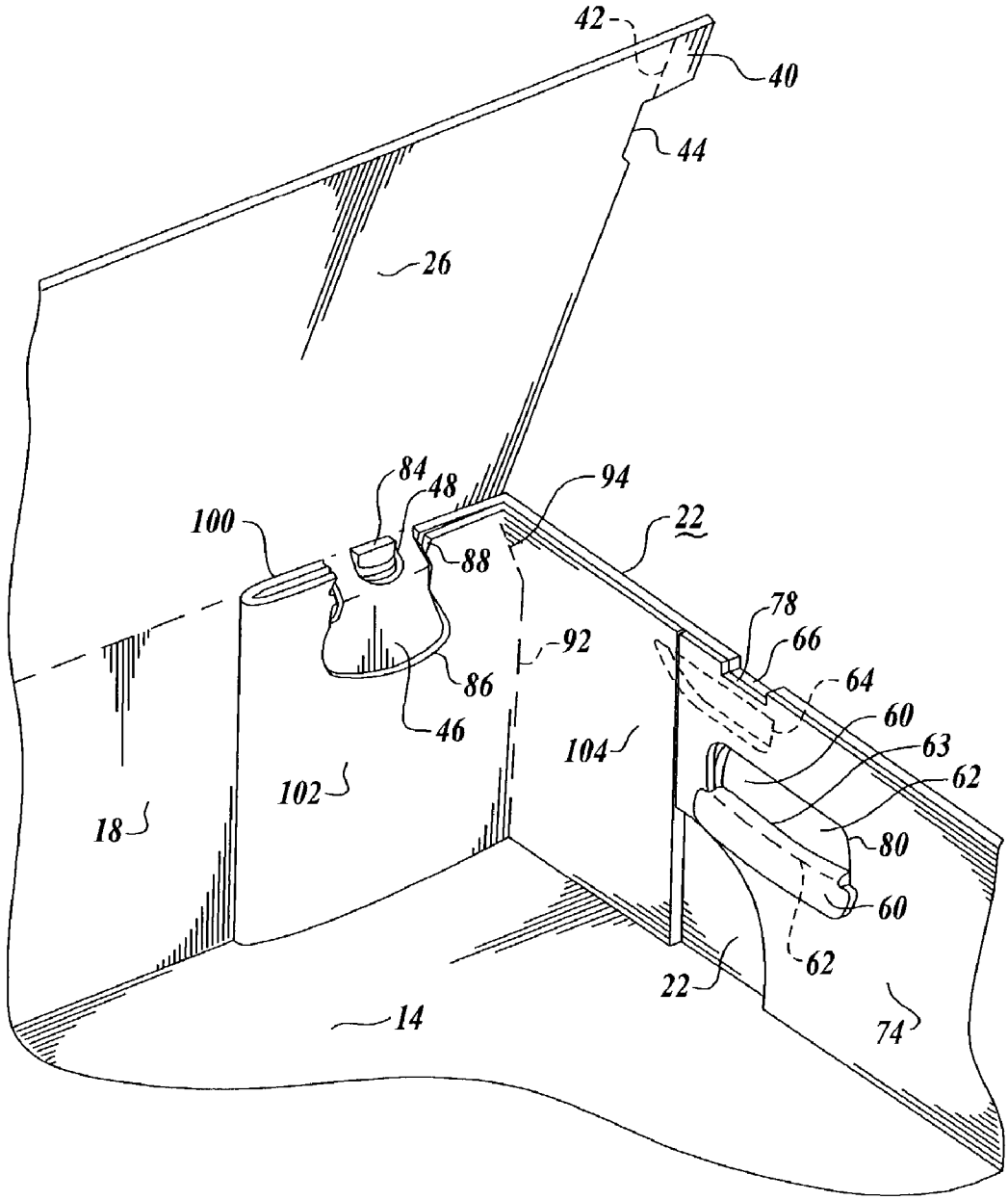

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Fig. 4.

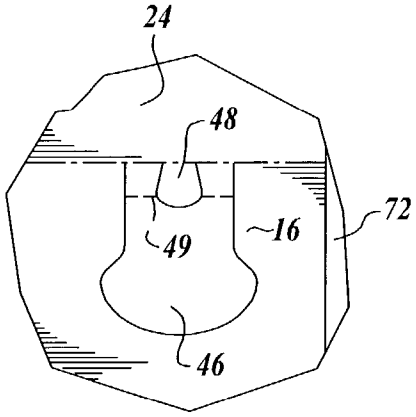


Fig. 5.

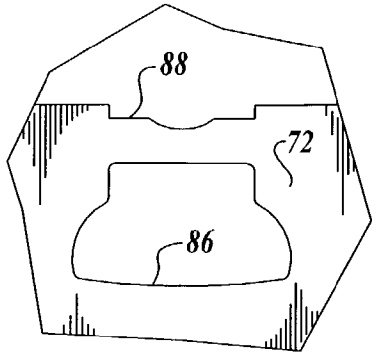


Fig. 6.

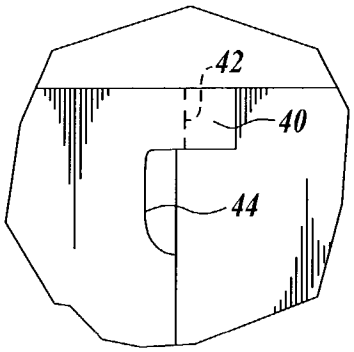


Fig. 7.

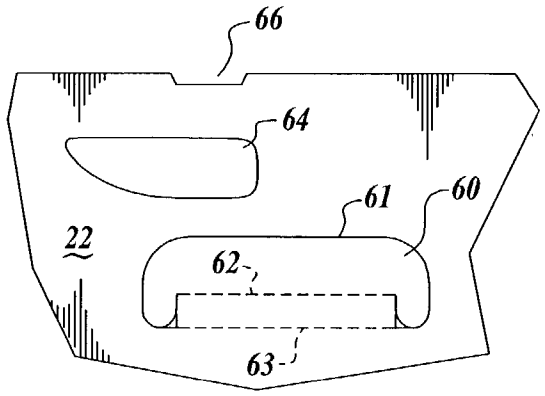


Fig. 8.

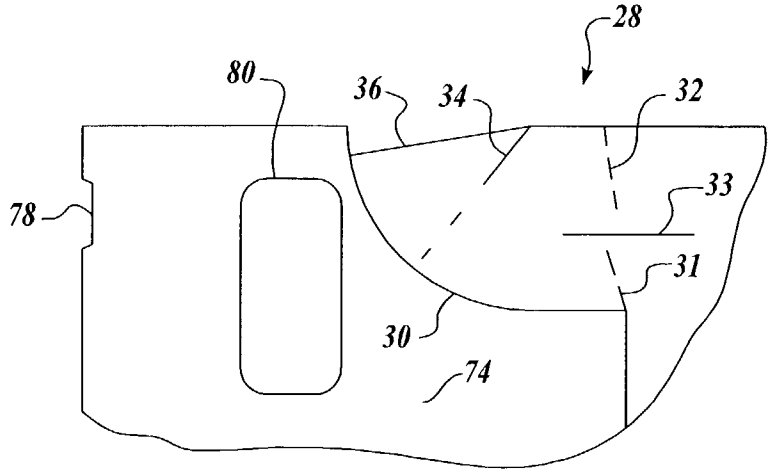


Fig. 9.

CONTAINER WITH LOCKING REINFORCEMENT PANELS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a division of U.S. patent application Ser. No. 09/757,375, filed Jan. 8, 2001.

FIELD OF THE INVENTION

[0002] The present invention pertains to paperboard containers having reinforced corners, and in particular, to locking mechanism used in the paperboard container blanks to help maintain an erected container form.

BACKGROUND OF THE INVENTION

[0003] It is well known to form paperboard containers that use extra wall layers to increase wall thickness at the corners of the container to improve stacking strength. Such containers are typically used with products that are unusually heavy, e.g., frozen meat, paper files, books, canned goods, etc.

[0004] One examples of such a container is shown in U.S. Pat. No. 5,000,377 to the present inventor. This prior container uses doubled-over reinforcing panel sub-assemblies at its interior corners and glue flaps about its exterior upper surface. This container is typically formed by machine. However, this can be a problem for small business that cannot afford the huge investment required to install tray formers and case sealers. To date, small manufacturers have had to settle for much more expensive and less efficient box styles than their large competitors. These expensive and less efficient box styles include "swing under" styles, double wall RSC's (regular slotted containers), and various combinations of hand-erected trays and HSC's (half slotted containers), all of which require much more board for a given endurance level.

[0005] Thus, a need exists for an efficient and less expensive container that may be used with these heavier products and that include superior locking mechanisms. The preferred container should be capable of relatively easy formation from paperboard blanks without the use of machinery or tooling. The present invention is directed to fulfilling these needs and others as described below.

SUMMARY OF THE INVENTION

[0006] In accordance with the teaching of the present invention, an efficient and easily hand-formed container is provided from a one-piece paperboard blank. The invention includes various inventive features which may be used singularly or in combination.

[0007] In one embodiment, the features are combined and the container includes a bottom panel, first and second opposed side walls, and first and second opposed end walls. A top lid panel connects to the first side wall and a bottom lid panel connects to the second side wall. A locking tab is formed in the first side wall and includes a thumb notch located within the tab. The top lid panel includes a pair of cover latches located on the outer corners thereof. A bottom lid panel connects to the second side wall and includes a pair of alignment tabs located on the outer corners thereof.

[0008] Each end wall includes a hand hole lock, a lock slot, and a recess located along an end wall exterior edge. The lock slot is located between the recess and the hand hole lock. Each end wall further includes first and second reinforcing panel sub-assemblies, each having an inner panel, a middle panel, and an outer panel. Each inner panel includes a pair of recesses with an intermediate tab located along an inner panel exterior edge. Each middle panel includes a locking slot near a middle panel exterior edge. The outer panel of the first sub-assembly includes a recess along an outer panel exterior edge and a hand hole.

[0009] As assembled, the locking tabs are disposed within the lock slots with the intermediate tab of the inner panel at least partially inserted into the locking tab thumb notch. The cover latches are inserted into the locking slots of the end walls. The alignment tabs are positioned in the aligned recesses of the outer panel and the end wall.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The foregoing aspects and many of the attendant advantages of this invention will become more readily appreciated as the same become better understood by reference to the following detailed description, when taken in conjunction with the accompanying drawings, wherein:

[0011] **FIG. 1** is a perspective view of a container formed in accordance with the present invention;

[0012] **FIG. 2** is a plan view of the paperboard blank from which the container of **FIG. 1** is formed;

[0013] **FIG. 3** is a fragmentary perspective view of an end wall exterior during assembly;

[0014] **FIG. 4** is a fragmentary perspective view of an end wall interior during assembly;

[0015] **FIG. 5** is a detail plan view of the locking tab shown in **FIG. 2**;

[0016] **FIG. 6** is a detail plan view of the lock slot shown in **FIG. 2**;

[0017] **FIG. 7** is a detail plan view of the alignment tab shown in **FIG. 2**;

[0018] **FIG. 8** is a detail plan view of the cover latch slot and hand hole lock of the end wall shown in **FIG. 2**; and

[0019] **FIG. 9** is a detail plan view of the cover latch shown in **FIG. 2**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0020] The present invention is a reinforced paperboard container that is easily hand-formed and includes one or more locking mechanisms that hold various container panels securely together. One such locking mechanism includes a uniquely shaped locking tab and lock slot that engage one another as assembled. A dogleg in the fold line in one of the related panels ensures that the lock slot is open and available to accept the locking tab. Another such locking mechanism is a uniquely shaped cover latch insertable into a cover latch slot formed in an end panel. Recesses are provided in various end panels to align the panels. Lastly, a hand hole lock is provided in the end wall. Both the recesses and hand hole lock work to hold the end panels together against the

push of the cover latch when it is inserted into the cover latch opening. These aspects and others are described in detail below.

[0021] FIGS. **1-4** illustrate an embodiment of a container **10** embodying each of the various inventive aspects of the present invention. As will be appreciated, however, these inventive portions may be used separately as well. Generally speaking, the container blank has a rectangular configuration with straight lines and perpendicular folds and edges. However, portions of the blank are of an irregular shape to provide features which will be discussed herein.

[0022] Referring to **FIG. 2**, the container blank **12** includes a bottom panel **14** with two pairs of opposed edges. First and second side walls **16, 18** are hingedly connected to a first pair of bottom panel opposed edges. First and second end walls **20, 22** are hingedly connected to the remaining pair of bottom panel opposed edges. In the embodiment shown, the side walls **16, 18** are located along the longer edges of the bottom panel **14**, and the end walls **20, 22** are located along the shorter edges. These hinged attachments are formed conventionally, such as by scoring.

[0023] The first side wall **16** includes a top lid flap **24** hingedly connected to the first side wall, opposite the bottom panel **14**. The second side wall **18** includes a bottom lid flap **26**. The lid flaps **24, 26** and side walls **16, 18** are arranged end-to-end in a series, with the bottom panel **14** in the center of the series. The top lid flap **24** includes cover latches **28** formed at each outer corner edge.

[0024] Referring to **FIG. 9**, each cover latch **28** includes an arcuate outer edge shape **30**. First and second inner scores **31, 32** are provided to distinguish the cover latch from the top lid panel **24**. A transverse cut line **33** is provided between the first and second inner lines **31, 32**. The transverse cut line **33** extends into both the cover latch **28** and the top lid flap **24**. A third score line **34** is formed in the body of the latch **28**, at a radial orientation. The first and second scores **31, 32** are spaced apart from the third score **34**. As shown, both the first score line **31** and the second score line **32** are angled outward for reasons are described below. Such angling is preferred but may be omitted for a particular arrangement. In the embodiment shown, the first and second scores are not oriented with the same angle-the first is more outwardly angled. The outermost edge **36** of the cover latch **28** is clipped inwardly to facilitate proper engagement with the cover latch slots.

[0025] Referring back to **FIG. 2**, the bottom lid flap **26** includes alignment flaps **40** formed at each outer corner edge. The alignment flaps **40** are generally rectangularly shaped with an offset fold line **42**. (See also **FIG. 7**.) A small portion of the lid **44** is removed from a location immediately inward of the alignment flap **40**.

[0026] Each side wall further includes locking tabs **46**. The locking tabs **46** are mushroom-shaped, with the base of the mushroom aligning with the hinge line between the side wall and its respective lid flap. The locking tab **46** includes a thumb notch **48** at the base of the mushroom shape, adjacent the hinge line. See **FIG. 5**. A secondary fold line **49** is available to simplify assembly, as described below.

[0027] The first and second end walls **20, 22** are formed similarly, except as mirror images of one another. Thus, for brevity, the first end wall will be described. The first end wall **20** is joined to the bottom panel **14** along hinge line **50**. The end wall has a first lateral edge defined by hinge line **52**, and a second lateral edge defined by hinge line **54**. The hinge lines **52, 54** are located at either end of and transverse to the aforementioned bottom panel hinge line **50**. Each hinge line **52** and **54** joins a series of reinforcing panel sub-assemblies generally indicated at **56** and **58**, respectively.

[0028] Each end wall includes a hand hole lock **60** formed from an arcuate cut line **61** and first and second perforate lines **62, 63**. See **FIG. 8**. Cover latch slots **64** are located above the hand hole lock **60** in the finished container (as can be seen in **FIG. 1**.) Each end wall **20** also includes a recess **66** located along the end wall's exterior edge. The recess **66** is preferably cut with sharp, 90 degree corners.

[0029] The first reinforcing panel sub-assembly **56** includes a series of hingedly connected inner, middle and outer panels **70, 72, 74**. A severing line **76** divides the side wall **16** from the inner and middle panels **70, 72**. The severing line **76** also divides the top lid panel **24** from the outer panel **74** in a manner which forms the cover latch **28**. The bottom panel hinge line **50** is slightly inwardly offset from the severing line **76**, so as to facilitate the folding operations described below.

[0030] The outer panel **74** includes an alignment flap recess **78** and a hand hole **80**. The recess **78** is preferably formed with sharp 90 degree corners. The inner panel **70** includes an outer edge having a pair of recesses **82** that are preferably formed with sharp 90 degree corners. The material between the recesses forms a sharply-cornered intermediate tab **84**. The middle panel **72** includes a lock slot **86** located near the middle panel outer edge. See **FIG. 6**. The lock slot **86** is shaped and sized to accept the mushroom-shaped locking tab **46** formed in the side wall **16**. The outer edge of the middle panel includes a recess **88**. The recess **88** is laterally aligned with the lock slot **86** and provides leeway for insertion of the locking tab **46** into the lock slot **86**.

[0031] The hinge line **90** joining the inner and middle panels is a perforated and scored line. The hinge line **92** joining the middle and outer panels is perforated. While the hinge lines **52, 90,** and **92** of the first sub-assembly are essentially orthogonal to the bottom panel hinge line **50**, a distal portion (labeled **94** in **FIG. 2**) of the hinge line **92** is slightly angled into the middle panel **72**. The hinge line **92** thus has a dog-leg shape.

[0032] The second reinforcing panel sub-assembly **58** also includes a series of hingedly connected inner, middle and outer panels **100, 102, 104**. As above, a severing line **106** divides the side wall **18** from the inner and middle panels **100, 102**. This severing line **106** also divides the bottom lid panel **26** from the outer panel **104** in a manner which forms the alignment flap **40**. The alignment flap **40** is joined to the bottom lid panel **26** by a hinge line **42** which is linear, though outwardly offset slightly, from the severing line **106**. As above, the bottom panel hinge line **50** is slightly inwardly offset from the severing line **106**, so as to facilitate folding. The panels of the second sub-assembly are similar to those of the first sub-assembly, except the outer panel **104** is cut to accommodate the alignment flap **40** and does not include a recess nor a hand hole.

[0033] Thus, as can be seen from studying **FIG. 2**, the container blank is symmetrical about a longitudinal center

line, but is not symmetrical about a transverse center line, e.g., the cover latches **28** are located at only the upper region of the blank in **FIG. 2** and the alignment flaps **40** are located at only the lower region.

[**0034**] The container **10** is erected as follows. Starting from a horizontally-oriented container blank **12**, each reinforcing panel sub-assembly **56**, **58** is folded upward, out of the plane of the blank along hinge lines **52** and **54**. The sub-assembly middle panel **72** is folded inward approximately 180 degrees from the inner panel **70**, while simultaneously folding the outer panel **74** upward 90 degrees from the middle panel **72**. The end result is a doubling-over of the outer and middle panels **74**, **72** onto the end wall **20** and inner panel **70**, respectively. See **FIG. 4**. The dog-leg fold line **92** between the middle and outer panels causes a vacancy between the inner panel **70** and the middle panel **72**. This vacancy facilitates assembly. As shown, the hand hole **80** and recess **78** in the first sub-assembly outer panel **74** align with the hand hole lock **60** and recess **66** of the end wall **20**, respectively.

[**0035**] After both reinforcing panel sub-assemblies have been formed, the combined sub-assembly and end wall structures are folded upright along the bottom panel hinge line **50**. As shown best in **FIGS. 1 and 3**, the hand hole lock **60** is pushed inward to frictionally engage the adjacent outer panel. The side walls **16**, **18** are then folded upright from the bottom panel along their available hinge lines. Simultaneously, the locking tab **46** is pushed inward and is made to go over the inner panel recesses **82** and the middle panel recess **88**. The locking tab **46** is then inserted into the lock slot **86** of the middle panel **72**. See **FIG. 4**. In going over the inner panel recesses **82**, the inner panel intermediate tab **84** is inserted through the thumb notch **48** of the locking tab. See **FIG. 4**. This provides a frictional relationship between the locking tab **46** and the side wall which helps to ensure the continued engagement of the locking tab in the lock slot **86**. This frictional relationship also aids in preventing movement of the container walls relative to one another.

[**0036**] Referring now to **FIG. 3**, the bottom lid flap **26** is folded horizontally until the alignment tabs **40** are located at the end wall recess **66** and the outer panel recess **78**. The alignment tabs **40** extend slightly beyond the outer face of the end wall and will eventually be folded downward by the cover latches **28**. Upon being folded downward, a proximal exterior edge **65** of the tab **40** becomes vertically oriented and exposed beyond the exterior surface of the end wall **20**. As is also shown in **FIG. 3**, the cover latch **28** is folded about its first and second score lines **31**, **32**. When the cover latch **28** is folded along these scores **31** and **32**, the transverse cut line **33** is forced into offset displacement, thereby exposing an upright surface **67** in the cut. The distal portion of the cover latch is folded 180 degrees about the third fold line **34** so that the distal portion tucks in and under the first and second score lines **31** and **32**.

[**0037**] The folded cover latches **28** of the top lid flap **24** are inserted into the cover latch slots **64** of the end walls. In doing so, the cover latches force the alignment tabs **40** into the recesses **66** and **78** therebelow. The small portion **44** of the lid that was removed below the alignment flap allows the alignment flap to bend slightly and be forced in this manner. The placement of the alignment flap in the recesses provides a locking function by helping to keep the end wall and outer panel adjacent one another and by helping to prohibit the bottom lid flap from moving laterally out of position. The cover latches further fold the ends of the alignment tabs downward. The now exposed exterior edges **65** of the alignment tabs engage frictionally with the exposed upright surfaces **67** of the cut **33**. This ensures the alignment tab's engagement in the recesses **78** and **66**, and ensures capture of the cover latch against the alignment tab.

[**0038**] As shown best in **FIG. 1**, the bottom portion of the inserted cover latch **28** is sandwiched between the end wall **20** and the reinforcing panel sub-assembly. The edge **36** of each cover latch **28** frictionally engages with the upper edge of the cover slot **64**. This action helps to maintain the cover latch in the slot. As assembled, a portion of the lid flaps overlaps, with the bottom lid flap being beneath the top lid flap.

[**0039**] As will be appreciated from a reading of the above, container **10** includes reinforced corners for improved stacking strength and the additional benefits associated with the various inventive locking mechanisms. The locking tab and lock slot engage one another in a secure manner. A dogleg in the fold line in one of the related panels ensures that the lock slot is open and available to accept the locking tab. The cover latch and cover latch slot are easily mated and when assembled provide the function of forcing the alignment tabs into adjacent recesses. The placement of the alignment tab in the recesses holds the end walls together and helps the container maintain its overall orthogonal panel orientations. In addition, the container blank may be prepared with the requisite score lines, blanking and other details, and then shipped to an end user, who, with relatively simple folding and interlocking operation, may form the blank into a finished container.

[**0040**] In addition, the cost of producing the present invention container blank is reduced while simultaneously providing an increase in compression strength. In one embodiment, the container size is reduced from about 21 square feet to about 16 square feet, with a corresponding compression strength increase from 1,437 pounds to 2,513 pounds. Corrugated paperboard and shipping costs may be further reduced by using a smaller size such that the container fits two wide on both a corrugator former and a shipping trailer, instead of the single wide size as was necessary with the prior container.

[**0041**] While the preferred embodiment of the invention has been illustrated and described, it will be appreciated that various changes can be made therein without departing from the spirit and scope of the invention. In particular, the drawings and the foregoing descriptions are not intended to represent the only forms of the invention in regard to the details of its construction and manner of operation. In deed, the inventive aspects taught by the present invention may be practiced alone or in combination. Further, as will be appreciated by those skilled in the art, various modifications are possible in how the various fold lines, etc. are formed. For example, perforations may be used in some instances, while crushes or even cuts are used in others.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A container formed from a one-piece blank, comprising:

a bottom panel having adjacent side and end edges;

a side wall hingedly connected to one said side edge of the bottom panel;

a top lid panel hingedly connected to said side wall, a locking tab formed in said side wall at the hinged connection, the locking tab including an aperture located within the tab;

an end wall hingedly connected to the end edge of the bottom panel; the end wall having opposed side edges oriented orthogonal to its hinged connection to the bottom panel;

the end wall including:

a reinforcing panel sub-assembly hingedly connected to one end wall side edge and including a first panel, and a second panel; one of said panels including a locking slot near a middle panel exterior edge; the other of said panels including a pair of recesses with an intermediate tab located along an inner panel exterior edge; and

wherein as assembled, the locking tab is disposed within the lock slot with the intermediate tab inserted into the locking tab aperture.

2. A container formed from a one-piece blank, comprising:

a bottom panel having adjacent side and end edges;

a side wall hingedly connected to one said side edge of the bottom panel;

a top lid panel hingedly connected to said side wall, a locking tab formed in said side wall at the hinged connection, the locking tab including an aperture located within the tab;

an end wall hingedly connected to the end edge of the bottom panel; the end wall having opposed side edges oriented orthogonal to its hinged connection to the bottom panel;

the end wall including:

a panel hingedly connected to one end wall side edge; said panel including a pair of recesses with an intermediate tab located along an inner panel exterior edge; and

wherein as assembled, the locking tab is disposed within the recesses with the intermediate tab inserted into the locking tab aperture.

3. A container formed from a one-piece blank, comprising:

a bottom panel having adjacent side and end edges;

a side wall hingedly connected to one said side edge of the bottom panel;

a locking tab formed in said side wall adjacent its upper edge, the locking tab including an aperture located within the tab;

an end wall hingedly connected to the end edge of the bottom panel; the end wall having opposed side edges oriented orthogonal to its hinged connection to the bottom panel;

the end wall including:

a panel hingedly connected to one end wall side edge; said panel including a pair of recesses with an intermediate tab located along an inner panel exterior edge; and

wherein as assembled, the locking tab is disposed within the recesses with the intermediate tab inserted into the locking tab aperture.

* * * * *